Honeywell
UOP

HYDRO PROCESSING TECHNOLOGY TRAINING

PROCESS VARIABLES

INSTRUCTORS

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PROCESS VARIABLES

01 Reactor Temperature

02 Conversion

03 Liquid recycle

04 Recycle Cut Point

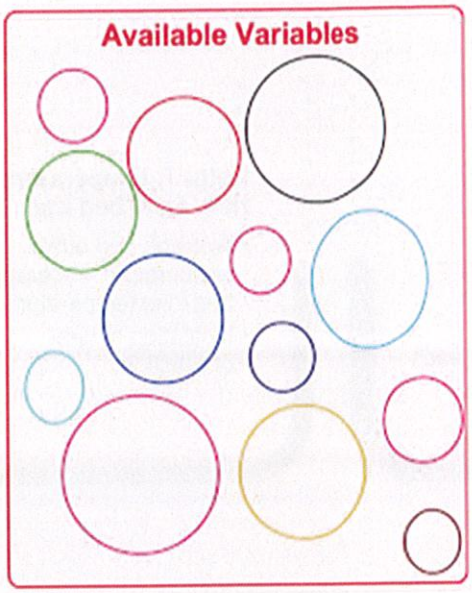
05 Feed Quality

06 Feed Rate (Space Velocity)

07 Recycle Gas Rate

08 Hydrogen Partial Pressure

09 Other variables



Variable Basket

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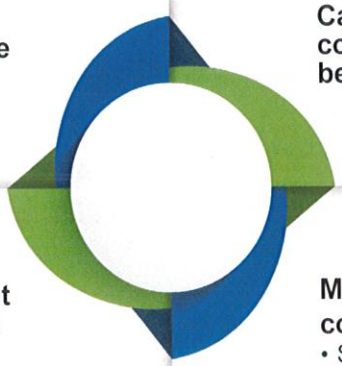
What to choose

REACTOR TEMPERATURE

Major control variable

Catalyst activity correlates to average bed temperature



Increased throughout cycle to compensate for decreasing catalyst activity

Maintaining close control is vital

- Stable operation
- Maximum cycle length

REACTOR TEMPERATURE CALCULATIONS

WABT – Weighted Average Bed Temperature

- Correlates to catalyst activity
- Critical parameter used for monitoring catalyst deactivation rates
- Calculation changes each time the reactors are loaded with catalyst

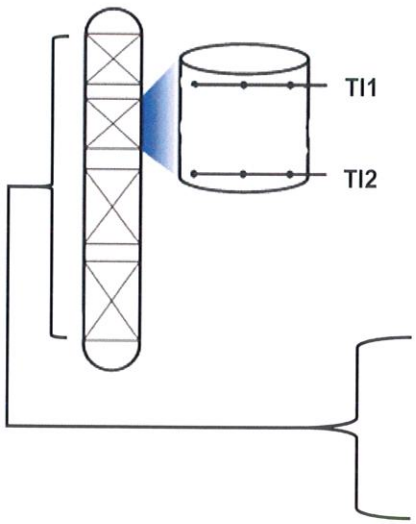
Delta T, temperature rise, axial bed rise

- Average bed outlet temperature – average bed inlet temperature
- Indication of heat of reaction

Radial temperature spread, radial DT

- Maximum – Minimum among temperature readings at the same level in the reactor
- Used as indication of flow distribution

WABT CALCULATION



CRACKING BED WABT CALCULATION:

$$\text{Bed ABT} = \frac{\text{Avg Inlet (TI1)} + \text{Avg Outlet (TI2)}}{2}$$

WABT of Reactor with 4 beds

BED	WEIGHT FRACTION OF CATALYST	ABT OF EACH BED	WEIGHT FRACTION X ABT OF EACH BED
1	0.1	385°C (725°F)	0.1 x 385°C
2	0.2	392°C (738°F)	0.2 x 392°C
3	0.3	391°C (736°F)	0.3 x 391°C
4	0.4	393°C (739°F)	0.4 x 393°C
Total	1.0	WABT (Reactor) = 391°C (737°F)	